

## FY 1983 RDT&amp;E DESCRIPTIVE SUMMARY

Program Element: #12431F

Title: Defense Support Program

Budget Activity: Strategic Programs, #1

## (U) RESOURCES (PROJECT LISTING): (\$ in thousands)

Project Number	Title	FY 1981	FY 1982	FY 1983	FY 1984	Additional	Total
		Actual	Estimate	Estimate	Estimate	To Completion	Estimated Costs
TOTAL FOR PROGRAM ELEMENT		87,570	145,750	120,447	50,275	Continuing	Not Applicable

## (S) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Defense Support Program

The system consists of satellites two large processing stations, one simplified processing station, one multi-purpose facility, and a ground communications network.

(S) BASIS FOR FY 1983 RDT&E REQUEST: Funds are included to complete the design and development of satellites 14 and beyond with survivability upgrades. Long lead procurement for satellites 14 - 17 will start in FY 1982 for those components which are not new and do not require major redesign. Satellite production will begin in FY 1983. Continuation of modifications for compatibility with Shuttle/Titan III(34)D/Inertial Upper Stage is included. Two satellites scheduled for a FY 1982 delivery will be Shuttle/Inertial Upper Stage compatible. Mobile Ground Terminal (MGT) and the associated user interface design will be completed in FY 1982. Design of Jam Resistant Secure Communication Interfaces and repackaging is included in FY 1983. The Mobile Ground Terminals are scheduled for an Initial Operational Capability. Funds are also included for General Systems Engineering/Integration. Cost data were derived by the Air Force Systems Command's Program Office using a combination of contractor estimates and past experience.

## (U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY:

RDT&E	FY 1981	FY 1982	FY 1983	FY 1984	Additional	Total
		Estimate	Estimate	Estimate	To Completion	Estimated Costs
Procurement (Missile)	87,570	146,300	TBD		Continuing	Not Applicable
Procurement (Other)	52,000	230,254	200,260		Continuing	Not Applicable
Operations and Maintenance	70,305	101,806	9,357		Continuing	Not Applicable
	50,835	53,434	63,118		Continuing	Not Applicable

## (U) OTHER APPROPRIATION FUNDS:

Procurement (Missile) (Quantity, Satellites)	52,000	241,354	407,500	366,300	Continuing	Not Applicable
		Long Lead	(2)	(2)		

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(U) OTHER APPROPRIATION FUNDS:	FY 1981	Estimate	Estimate	Estimate	To Completion	Cost to
(Procurement (Other)(Includes Initial spares) (Quantity, Mobile Ground Terminals)	70,305 (1 MGT)	101,140 (2 MGTs)	89,292 (3 MGTs)	5,345	Continuing	Not Applicable
Operations and Maintenance	44,659	53,920	60,641	61,799	Continuing	Not Applicable
Military Construction Program	0	0	1,900	0	Continuing	Not Applicable

Program Element: #12411F

Title: Defense Support Program

Project Activity: Strategic Programs, #1

**(8) DETAILED BACKGROUND AND DESCRIPTION:** The Defense Support Program (DSP)

The system is operational

to the National Command Authorities (NCA) and other designated users.

The system's current deployment consists of

Two dedicated ground stations, one overseas and one within the Continental United States (CONUS), receive, process, The Simplified Processing Station provides a backup capability to the current ground stations to enhance mission data survivability and increase the probability that data will be available. It is currently deployed in the CONUS, but can be moved overseas to back up the Overseas Ground Station. The Multi-Purpose Facility provides training, analysis, software maintenance/integration

The Joint Chiefs of Staff have designated the Aerospace Defense Command, Strategic Air Command, National Military Command System, Atlantic Command, Pacific Command, European Command,

as users of DSP data. Evolutionary satellite improvements are intended to prolong the useful life of each satellite, make the satellite more survivable, increase the viewing area of each satellite, and increase the accuracy of data

for the NCA decision-making process. Modifications under development will ensure that the DSP payloads are compatible with Shuttle/Titan III(34)D/Inertial Upper Stage (IUS) capabilities. The Mobile Ground Terminals will provide DSP data survivability by deploying a truck mounted data processing and communication capability. Future satellites scheduled for delivery starting in FY 1986 will include significant data survivability improvements.

**(8) RELATED ACTIVITIES:**

Defense Satellite Communications System (P.E. 33110F) provides primary communications routing for DSP overseas data and will help provide Mobile Ground Terminal communications. Space Boosters (P.E. 35119F) provides launch support. Space Vehicle Subsystems Advanced Development (P.E. 63401F) is developing technology for improved satellite navigation, power, and propulsion systems.

DSP is the key element of the Worldwide Military Command and Control Systems (WMCCS)

After transition to the Space Shuttle, Space Launch Support Program (P.E. 35171F) will provide inertial upper stages and Space Shuttle flights for DSP missions. DSP Communications (P.E. 12447F) provides operations and maintenance for the DSP Ground Communication Network.

(S) WORK PERFORMED BY: Commander-In-Chief, Aerospace Defense Command, maintains operational control of Defense Support Program (DSP) for the Joint Chiefs of Staff. Strategic Air Command and the Air Force Communications Command are the system operators and maintainers of the DSP ground stations. Air Force Systems Command's Space Division, Los Angeles, CA, has overall development and procurement management responsibility and program management of the satellites. The Air Force Logistics Command provides engineering and logistics support. Air Force Weapons Laboratory, Kirtland Air Force Base, NM, will provide facility support. The Air Force Test and Evaluation Center, Kirtland Air Force Base, NM, participates in test and evaluation of selected system segments. TRW, Redondo Beach, CA, is the prime contractor for the space-craft and satellite integration. Aerojet Electro Systems Company, Azusa, CA, is the prime contractor for the infrared sensor and the computer replacement. The Martin-Marietta Aerospace Company, Denver, CO, is the integration contractor for the Titan IIT boosters. The Department of Energy (Sandia Corporation)

IBM, Thousand Oaks, CA, is the prime contractor for all software efforts as well as the prime contractor on the Simplified Processing Station and Mobile Ground Terminals. The Aerospace Corporation, Inglewood, CA, furnishes general systems engineering/integration for the DSP System Program Office.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (S) FY 1981 and Prior Accomplishments: Significant accomplishments to date include procurement of 13 satellites and 12 Titan IIC boosters, construction of two data processing facilities, and provision of user displays, software, communications and a training facility (also used for software development and mission data analysis), completion of Research and Development (R&D) for modifications to satellites 10-12 to improve survivability and to provide data survivability, and completion of development of hardware and software for the Simplified Processing Station. Development, initiated in FY 1976, continues on an improved sensor

In June 1976, a software package was delivered

for satellite retrofit to improve survivability. Development of modifications was completed. R&D support for DSP augmentation was completed. Ground station modifications for compatibility with a satellite anti-jam command capability were completed. Satellite Tracking Set Training Equipment was delivered.

Critical Design Review was conducted in June 1978 on a new sensor which is to provide more accurate data

the retrofit of two satellites with an improved Infrared sensor continues. Funding ensuring Titan III(34)D/Shuttle/Inertial Upper Stage (IUS) compatibility continues. In December 1978 the Simplified Processing Station (SPS) was shipped for initial operational test and evaluation. The testing was completed in June 1979.

Satellite calibration and masking effects verification experiments were performed to determine infrared sensor responsivity. In June 1980 a contract was awarded to replace the computers in the Defense Support Program (DSP) ground stations and the training and development facilities. This replacement is necessary to provide processing capability for new satellites and to avoid obsolescence. In April 1981 a contract was awarded to procure one Mobile Ground Terminal with options to buy two more plus the support capability in FY 1982 and three more in FY 1983. Contracts were awarded in August 1981 and October 1981 for the satellite 14-17 sensor and spacecraft full scale engineering development.

## 2. (8) FY 1982 Program:

In February 1980 the Deputy Secretary of Defense chose the option that increased the survivability of the current DSP. These survivability upgrades include the following: (1) Mobile Ground Terminals and associated Jam Resistant Secure Communications (JRSC) Terminals will provide survivability to the ground processing and communication of satellite data

- (2) a satellite-to-satellite crosslink
- (3) a Mission Data Message rebroadcast capability

Design of the Mobile Ground Terminals will be completed in FY 1982. The basic computers and software will be the same as those used in the Simplified Processing Station. The design funds will be used primarily for the repackaging of the components, the new antenna subsystem, and to ensure that the mobility requirements are met. A total of six Mobile Ground Terminals are required to ensure survivability of DSP data with today's threat.

One MGT is being procured in FY 1981. Two plus support are being procured in FY 1982. Also the design and development of the survivability upgrades,

which will be incorporated on satellite 14 and beyond, will continue. In FY 1982, the satellite 14 sensor design will be completed. The satellite 14 spacecraft design will be completed in FY 1983. Long lead items for four of these satellites will be procured in FY 1982.

Expenditures include the continuation of the DSP satellite compatibility development with the Shuttle/Titan III(34)D/IUS and the Titan III(34)D/Transtage. This development is necessary to ensure that the DSP satellites are compatible with the IUS interfaces and support the program transition to a Shuttle launch capability. The development efforts will be applied to insure that the system design will incorporate launch and recovery loads, safety requirements, interface compatibility and contamination protection. The current plan for DSP satellite launches is as follows: one more Titan IIIC launch, one Titan III(34)D/Transtage launch and one Titan III(34)D/Inertial Upper Stage (IUS) launch, and all subsequent launches on Shuttle/IUS. Orbital operations data analysis, survivability and satellite improvement efforts will continue.

3. (S) FY 1983 Planned Program: The satellite 14 and beyond spacecraft design will be completed in FY 1983 with the last Critical Design Review in May 1983. This spacecraft design will include many redesigned components necessitated by obsolescence of parts, Shuttle compatibility.

Based on the new sensor design satellites 14 and 15 will be procured on a fully funded basis. The development of the satellite/Titan III(34)D/Shuttle/Inertial Upper Stage and satellite/Titan III(34)D/Transtage compatibility will continue. Three production Mobile Ground Terminals will be procured. The primary communication capability for the Mobile Ground Terminals is through the Defense Satellite Communication System using a mobile Jam-Resistant Secure Communication terminal built by the Army. These units, as delivered by the Army, will not be completely compatible with the Mobile Ground Terminals. In order to ensure proper communication interfaces with the Mobile Ground Terminals, compatible set-up and tear-down times, the Jam Resistant Secure Communication terminals will be repackaged. Orbital operations support, survivability improvements, computer software modification to support new satellites and satellite/ground station upgrade will continue. Funding changes from the FY 1982 submission reflect: full funding of satellites 14-17 vice incremental funding in missile procurement, addition of the peripheral replacement in the ground station, and funding of Mobile Ground Terminals 4-6 in other procurement. A main operating base will be built in the United States for the Mobile Ground terminals.

4. (U) FY 1984 Planned Program: Satellites 16 and 17 will be procured. The development of the payload/Titan III(34)D/Shuttle/Inertial Upper Stage compatibility will continue. General system engineering/integration will continue, as well as orbital operations support, survivability, computer software improvements and satellite improvement efforts. Ground station design for satellites 14-17 will start.

5. (U) Program to Completion: This is a continuing program. RDT&E funding will support continuing satellite/system development in support of Department of Defense requirements. Primary emphasis will be directed toward eliminating or minimizing operational employment deficiencies, the use of the Space Shuttle and/or Titan III(34)D/Inertial Upper Stage in lieu of the Titan IIIC, the development of a survivable DSP system through Mobile Ground Terminals and satellite upgrades, and the adequacy of the ground station data processing capability.

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6. (S) Milestones:

Date

A.	
B.	
C.	
D. <u>Delivery of Satellite #5</u>	Mar 1973
E.	
F. <u>Delivery of Satellite #6</u>	Jul 1973
G. <u>Delivery of Dual Satellite Software</u>	Feb 1974
H. <u>Delivery of Satellite #8</u>	May 1974
I. <u>Delivery of Satellite #7</u>	Oct 1974
J. <u>Delivery of Satellite #9</u>	Mar 1975
K.	
L.	
M.	
N. <u>Delivery of Simplified Processing Station (SPS)</u>	Dec 1978
O.	
P. <u>Retrofit of Titan III(34)D/Inertial Upper Stage (IUS) Compatible Satellite Complete</u>	Jun 1981
R.	
S. <u>Retrofit of Shuttle/IUS Compatible Satellite Complete</u>	* (3Q CY 1982) 4Q CY 1982
T. <u>Completion of Computer Replacement</u>	2Q CY 1983
U.	
V. <u>Satellite #14 Delivery</u>	4Q CY 1985
W. <u>Satellite Launches</u>	As required

\*Date presented in FY 1982 Descriptive Summary. Explanation of milestone changes follow:

P.  
S. Satellite delivery has slipped due to solder joint problem in the sensor.  
U. IOC has slipped to allow time for Initial Operational Test and Evaluation.

7. (U) Resources: Not applicable.

8. (U) Comparison with FY 1982 Descriptive Summary: Not applicable.

Budget Activity: Strategic Programs, R-1

Program Element: #12411F, Defense Support Program

Test and Evaluation Data

1. (b) Development Test and Evaluation: The Defense Support Program has been designed, developed, tested and deployed as an operational system in the early 1970's. The system is a classified space program consisting of ground control and readout stations that receive data from satellites, process the information to the National Command Authorities and military commanders for decision-making purposes. Development, Test and Evaluation/Initial Operational Test and Evaluation on the prototype Simplified Processing Station was completed in 1978. Over the next several years three major system upgrades will require Development, Test, and Evaluation. They are the Sensor Evolutionary Development the Mobile Ground Terminals; and the Satellite 14 and beyond survivability upgrades.

These upgrades have three different elements: the satellite, the software modifications and the ground station upgrade which involves replacing the computers. The sensor portion of the satellite is being produced by Aerojet ElectroSystems Corporation,

and the spacecraft is being produced and integrated by TRW, Incorporated. Development, Test and Evaluation will be performed at the Aerojet ElectroSystems Corporation and TRW facilities prior to government acceptance, which is scheduled for fiscal year 1982. The satellites will then be stored until there is a launch requirement. The computers are being replaced at all Defense Support Program locations by Aerojet ElectroSystems Corporation. This replacement is scheduled to be completed by fiscal year 1983. Development, Test and Evaluation will be accomplished on this replacement in conjunction with acceptance testing. The system software is being modified to accommodate the Sensor Evolutionary Development satellites by International Business Machines Corporation. Development, Test and Evaluation will be accomplished prior to turnover to Strategic Air Command (scheduled for fiscal year 1982) who will integrate the software into the operational system. This initial software installation will process data from the current satellite configuration. When the first Sensor Evolutionary Development satellite is launched, Air Force Systems Command will accomplish a system level Development, Test and Evaluation to ensure that all elements of the system work together, including the satellite, the ground station hardware and the software. The purpose of the Mobile Ground Terminals is to provide survivability to the Defense Support Program ground processing and communication elements through mobility. They will use the same computer hardware and software as the Simplified Processing Station. The prime contractor will be International Business Machines Corporation. Development, Test and Evaluation will be accomplished on the antenna which is new and at the Mobile Ground Terminal system level to ensure that the Mobile Ground Terminal can meet its mobility and communication goals. Satellite 14 and beyond will include several survivability upgrades directed by a Defense System Acquisition Review Council.

Development of these satellites started in late fiscal year 1981 and the first will be delivered in late fiscal year 1986. The ground station and software modifications have not been defined. The Development, Test and Evaluation program for these upgrades will be very similar to the Sensor Evolutionary Development, Test and Evaluation program.

2. (U) Operational Test and Evaluation:

a. . Combined Development Test and Evaluation (DT&E) and Initial Operational Test and Evaluation (IOT&E) was performed on the Defense Support Program (DSP) prototype Simplified Processing Station (SPS) from 26 August 1978 to 6 November 1978 at Vandenberg Air Force Base, California. This combined test was then followed by dedicated IOT&E

The Space and Missile System Organization (SAMSO) was responsible for DT&E while the Air Force Test and Evaluation Center (AFTEC), assisted by personnel from the Aerospace Defense Command (operating command for DSP), managed and conducted IOT&E.

b. (U) IOT&E was conducted with prototype SPS hardware and software. The objectives were to evaluate the system's performance and to estimate the reliability, availability and maintainability of an operationally deployed system. The IOT&E report, October 1979, identified three major deficiencies which would prevent the SPS from being operationally useful. These were:

(3) (U) Excessive computer-generated message error rate - Mission messages were periodically rejected at the data distribution center because of parity error. As a result, mission messages were lost.

d. , Phase I follow-on test and evaluation (FOT&E) of the SPS was conducted by AFTEC

The purpose of the Phase I FOT&E was to confirm correction of the deficiencies identified during IOT&E:

e. (S) Phase II FOT&E of the SPS was conducted by SAM

As indicated above, AFTEC managed the IOT&E and Phase I FOT&E for the SPS

Preparation of SAC's final Phase II FOT&E test report is in progress. Test team briefings to the SAC staff, ADCOM and NORAD on test results are to be completed by October 1981. SPS system IOC is expected by December 1981. SAC plans to move the SPS to an overseas location as soon as practical after IOC to enhance the availability and preattack survivability of the DSP Eastern hemisphere data.

g. OT&E for the Sensor Evolutionary Development Satellites and  
Ground Terminals, and Satellite 14 and beyond is currently in advance planning.

Mobile